[0007]

Furthermore, fraud on a game table is so sophisticated that it is not possible to find, for example, fraud made in a sophisticated way of betting by, for example, simply detecting that the amount won on a certain game table is large with a camera, thus posing a new problem.

[0008]

Moreover, a dealer needs to collect game tokens and distribute game tokens as a reward placed on a game table according to win-loss results. Assume that this operation is determined by image analysis. In this case, because each game token (chip) has a complex design, it is not possible with any existing practical image analysis technique to determine whether the dealer has performed correct distribution for a reward when distributing chips as a reward corresponding to bet chips, thus resulting in the problem of insufficient prevention of mishandling.

Solution to Problem

[0008a]

An aspect of the present invention provides a system for determining a value of each of one or more game tokens forming one or more stacks, wherein the game token has a notation representing the value on its flat surface and has a first color portion representing the value in color and a second color portion not representing the value on its side, the system comprising a camera that captures an image of the one or more game tokens that form one or more stacks; and one or more processors, which use deep learning techniques to analyze one image captured by the camera in which one or more of the first color portions and one or more of the second color portions appear; identify, based on the color of one or more of the first

color portions in the image, the value of one or more game tokens forming one or more stacks in the image; identify the one or more stacks in a predetermined target area; and identify a total value of the game token for each of the one or more stacks based on the value and number of the game token forming the one or more stacks.

[0009]

A table game management system as disclosed includes a card distributor that determines and displays a win-loss result on each game on a game table, a measurement device that measures types and number of game tokens

A game token as disclosed includes an arrangement having plastic layers with a plurality of different colors stacked on each other, with a colored layer being provided at least intermediately, and white layers or light-colored layers being stacked on two sides of the colored layer, so as to form a striped pattern on a side surface in a stacking direction and allow identification of the type of game token according to the colored layer.

[0012]

In addition, the game token has a print indicating the type of game token provided on a surface of the white layer or the light-colored layer, and a transparent layer is provided on an outermost layer, with the layers being bonded to each other by thermal compression to form at least a five-layer structure.

[0013]

Furthermore, the game token may be configured such that a mark formed by UV ink or carbon black ink is provided on a surface of the white layer or the light-colored layer, that the transparent layer on the outermost layer is embossed, that R chamfering is provided to an edge of the transparent layer on the outermost layer, that the colored layer includes a plurality of layers, or that the colored layer incorporates an RFID.

[0014]

An inspection apparatus that inspects a game token as disclosed includes a path including an inlet and an outlet through which a game token is allowed to pass in a radial direction, a chip type determination device that determines the color of a striped pattern on a side surface of a game token in a stacking direction by shooting the game token passing through the path, a mark reader that reads a mark printed by UV ink or carbon black ink and provided on a surface of a passing game token, a print inspection device that reads a print indicating a type, which is provided on a surface of a game token, from a direction perpendicular to the path, and a control device for the overall apparatus, wherein the control device is configured to inspect whether a chip type determined by the chip type determination device matches information of the print indicating the type obtained from the print inspection device.

Advantageous Effects of Invention

[0015]

A system according to embodiments of the present invention allows determination of the number of game tokens (chips) by image analysis even if a large number of chips are stacked on each other, and can grasp the total amount of game tokens stacked relatively high on the basis of the position and the colors.

Brief Description of Drawings

CLAIMS

1. A system for determining a value of each of one or more game tokens forming one or more stacks, wherein the game token has a notation representing the value on its flat surface and has a first color portion representing the value in color and a second color portion not representing the value on its side,

the system comprising:

a camera that captures an image of the one or more game tokens that form one or more stacks; and

one or more processors, which use deep learning techniques to:

analyze one image captured by the camera in which one or more of the first color portions and one or more of the second color portions appear;

identify, based on the color of one or more of the first color portions in the image, the value of one or more game tokens forming one or more stacks in the image;

identify the one or more stacks in a predetermined target area; and

identify a total value of the game token for each of the one or more stacks based on the value and number of the game token forming the one or more stacks.

2. The system according to claim 1, wherein the one or more

processors extracts the first color portion from the image and identifies the value of the game token based on the color of the extracted first color portion.

3. The system according to claim 1, wherein the game token has a pattern on its side in which at least a portion of the first color portion is sandwiched between other color portions.

4. The system according to claim 2, wherein the one or more processors identifies the number of the one or more game tokens according to the number of the first color portions extracted.

5. The system according to claim 1, wherein the game token has information that can identify the value other than the notation and the first color portion.

6. The system according to any of claims 1 to 5, wherein the one or more processors inspect whether each of the values identified by each of a plurality of methods from the game token matches each other.

7. The system according to claim 6, wherein the one or more processors inspect whether the value represented by the notation matches the value identified based on the first color portion.

8. The system according to any of claims 5 to 7, wherein the information is stored in the RFID embedded in the game token.

9. The system according to claim 8, further comprising a reader that reads the RFID.